

APPENDIX F

# Quino Checkerspot Butterfly Habitat Survey for NASA-Administered Property at Santa Susana Field Laboratory

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**HABITAT ASSESSMENT FOR THE  
ENDANGERED QUINO CHECKERSPOT BUTTERFLY  
AT THE NASA-ADMINISTERED AREAS I AND II OF THE  
SANTA SUSANA FIELD LABORATORY**

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## INTRODUCTION

CH2M Hill, Inc. is assisting the National Aeronautics and Space Administration (NASA) in the preparation of a Natural Resources Management Plan for NASA-administered portions of the Santa Susana Field Laboratory (SSFL). The 2,850-acre SSFL property is located in the hills between Simi Valley and Woodland Hills in eastern Ventura County, CA.

One of the sensitive resources that might possibly occur at the SSFL is the federally endangered Quino Checkerspot butterfly (*Euphydryas editha quino*, Lepidoptera: Nymphalidae). Entomological Consulting Services, Ltd. was hired to assist CH2M Hill in the evaluation of existing habitat conditions to support the Quino Checkerspot in two NASA-administered portions of the SSFL; 41.7 acres within Area I and all 409.5 acres of Area II. Several small additional sectors of SSFL that total 43 acres and border Areas I and II were also included in this habitat assessment survey for the endangered butterfly. All surveyed portions of the SSFL for this habitat assessment are illustrated in Figure 1, an aerial photograph of the site, while Figure 2 illustrates the boundaries of the surveyed areas on the Calabasas topographic map (US Geological Survey 7.5' series).

The remainder of this report provides pertinent background information on the Quino Checkerspot butterfly and the habitats that occur at the SSFL property. It also describes our survey methods and the findings from our habitat assessment survey.

## BACKGROUND INFORMATION

### **Conservation Status.**

The Quino Checkerspot butterfly, *Euphydryas editha quino* (Behr) 1863, was listed as an endangered species in late 1990's by the US Fish & Wildlife Service (1997). The primary threats that led to its recognition as an endangered species were loss and degradation of its habitats, fragmentation of remaining occupied sites, lack of connectivity between remaining occupied sites, and adverse impacts due to fire management practices.

The butterfly is not recognized as endangered by the State of California. The state's Fish and Game Code specifically excludes insects as a type of animal that can be recognized as endangered under the state's endangered species statute.

A recovery plan was prepared by the US Fish & Wildlife Service (2003). Ten units of critical habitat, including seven in Riverside County and three in San Diego County, have been recognized (US Fish & Wildlife Service 2009).

### **Distribution.**

Historically, the Quino Checkerspot occurred primarily in Los Angeles, Orange, San Bernardino, Riverside and San Diego counties of California. It was also found in the northwestern part of Baja California, Mexico. Today, all of the currently known locations that still support the Quino Checkerspot are in Riverside and San Diego counties (US Fish & Wildlife Service 2003, 2009).

Based on a review of literature, museum collection records, and findings of recent surveys (BUGGY Data Base, 2012; California Natural Diversity Data Base, 2012), I could not find any bona fide records for Ventura County. Nonetheless, due to the SSFL's location near the Ventura-Los Angeles County border, and restricted access at this property for many decades, it is certainly plausible that the butterfly might be found there if suitable habitat conditions were present.

### **Natural History.**

The Quino Checkerspot is usually associated with openings in scrub, coastal sage scrub, chaparral, oak woodland, and grassland plant communities, especially openings that are characterized by native bunch grasses and forbs. The primary oviposition and larval food plant is Dwarf (also sometimes referred to as "Erect") Plantain (*Plantago erecta*, Plantaginaceae). Larvae occasionally have also been observed feeding on Purple Owl's Clover (*Castilleja exserta*, Orabanchaceae), Rigid Bird's Beak (*Cordylanthus rigidus*, Orabanchaceae), White Snapdragon (*Antirrhinum coulterianum*, Plantaginaceae), and Southern Chinese Houses (*Collinsia concolor*, Plantaginaceae) (Pratt and Emmel 2010).

The sequence of life history events for the Quino Checkerspot can be described as follows. The butterfly is univoltine, i.e., it has one generation per year. There are four stages in the butterfly's life cycle: egg, larva (i.e., caterpillar), pupa, and adult. Its adult flight season is typically about six to eight weeks in length, usually starting in early February and terminating in April. Actual starting and ending times can vary by several weeks between years, as well as the length of the flight season. Individual adults live approximately one to two weeks, during which time they must mate and reproduce. Adults obtain energy and nutrients from the nectar of various native, annual wild flowers, including: *Lasthenia*, *Cryptantha*, *Gilia*, and *Linanthus*, but will occasionally utilize flowers of other plants to obtain nectar.

Mate location occurs primarily on hilltops, where both sexes congregate after eclosion (i.e., adult emergence from the pupa). Upon mating, females disperse throughout the hilltops and downslope from the hilltops to lay their eggs. The eggs are generally laid in masses near the base of *Plantago erecta* plants.

Larvae hatch in about 10-14 days and feed for approximately another 2-4 weeks until their food plants senesce or are defoliated. Young larvae, which have limited mobility at this stage, frequently fail to find sufficient edible food plants and starve. Typically, 90% or more of these young larvae starve to death. As its annual food plant senesces, the partially grown larvae enter a physiological dormant period, known as diapause, which is spent under rocks or in cracks and crevices in the soil to survive the dry season when there is no food for the larvae. The dry season diapause ends with the onset of the next rainy season and the germination of *Plantago erecta*. Post-diapause larvae resume feeding at that time. Because the larvae are cold-blooded, their activity is limited to warm days in the winter. Thus, they especially favor open-canopy areas where sunlight can hit the ground to help them warm up and remain active. After periodic feeding for several weeks they complete their development by pupating. The pupal stage generally lasts about 2 weeks before emergence of the adult butterfly.

### **Habitats at Areas I and II of SSFL.**

A variety of habitat types occur within 41.7-acre study site of Area I and the 409.5-acre Area II at SSFL. These were identified and mapped by CH2M Hill, Inc. during the fall of 2010 (NASA 2011). The habitat types and their approximate acreages (NASA 2010) include:

- a) *Baccharis* Scrub (2.6 acres);
- b) Chaparral (172.6 acres);
- c) Coast Live Oak Riparian Forest (9.2 acres);
- d) Coast Live Oak Woodland (13.2 acres);
- e) Freshwater Marsh (0.2 acre);
- f) Mulefat Scrub (2.1 acres);
- g) Non-native Grassland (18.6 acres);
- h) Venturan Coastal Sage Scrub (64.4 acres);
- i) Southern Willow Scrub (1.0 acre);
- j) Undifferentiated Wetland (0.6 acre);
- k) Developed, i.e., buildings, paved roads, parking lots, etc. (58.1 acres);
- l) Open water, i.e., stormwater detention basins (0.4 acre);
- m) Rock Outcrops (84.5 acres); and
- n) Ruderal (16.8 acres).

Figure 3 illustrates the locations of these habitat types within our study areas at the SSFL.

### **HABITAT ASSESSMENT METHODS**

CH2M Hill, Inc. provided several background materials that were reviewed before our first site visit. These items included reports, maps, and aerial photographs of the study areas, as well as GIS shapefiles for the boundaries of the study areas. The GIS shapefiles, depicting the boundaries of our study areas I and II were loaded into two mapping-grade GPS units manufactured by Trimble to guide our field surveys.

Dr. Robert B. Jensen and I initially visited the SSFL on 18 July 2011 to familiarize ourselves with the property and study areas. Although we had originally intended to survey for dried specimens of *Plantago erecta*, we did not see any remnant individuals of this or other larval food plants and decided to postpone our habitat assessment until the spring of 2012 when the food plants would be more apparent.

Our return field visits occurred between March 5 and 7, 2012. We selected these survey dates because local colleagues indicated that *Plantago erecta* was blooming at other locations. Upon our arrival, Randy Dean of CH2M Hill, Inc., took us to a known location at the SSFL property (but outside of our habitat assessment survey area) where *Plantago erecta* had previously been observed (Faulkner 2010). We confirmed the presence of the food plant, which was in full flower. We then returned to Areas I and II to conduct our habitat assessment surveys.

Initially we drove all of the existing roads within or adjacent to both study areas to determine where there was unsuitable habitat and where there was potentially suitable habitat that might support the butterfly and its food plants that required more intensive searches for the food plants. Unsuitable habitat was characterized by developed areas (i.e., buildings and other

facilities), hardscape (i.e., paved roads, parking lots, etc.), heavily disturbed soils, ruderal vegetation, closed-canopy (i.e., lacking openings where food plants might grow) woodlands, riparian, close-canopy chaparral or scrub, and aquatic habitats (i.e., ponds, drainages, etc.). These areas of unsuitable habitat were noted on a set of aerial photographs for Areas I, II, and the extra survey areas after some spot-checking for larval and adult food plants at selected locations to confirm their absence.

We then returned to all portions of Areas I and II that were initially identified as potential habitat for the food plants of the Quino Checkerspot. These included rock outcrops with patches of thin soils, grasslands, and areas of open canopy woodland, scrub, or chaparral. We systematically hiked throughout all such accessible portions of Areas I, II, and the extra survey areas. Due to the steepness of some rock outcrops, for safety reasons we surveyed these areas using binoculars and a spotting scope from various nearby vantage points.

Locations of any observed food plants were mapped with the Trimble GPS units. All positional information was differentially corrected and converted to ArcGIS (version 10) shapefiles.

Photographs of representative habitat conditions were taken at various locations throughout Areas I, II, and the extra survey areas. A Ricoh-GPS camera was utilized to associate each photograph with its location (Figure 4). The identification numbers of the 72 photopoint locations illustrated in Figure 4 match each photo's identification number in Appendix A of this report.

## SURVEY RESULTS

*Plantago erecta* was observed growing at small patches of thin soils situated on north-facing rock outcrops within a localized portion of Area I. These locations are illustrated in Figure 5. Despite our intensive surveys throughout other portions of Areas I and II, as well as the extra survey areas, it was not observed anywhere else. None of the other known larval food plants of the Quino Checkerspot were observed during our habitat assessment survey. The only adult nectar plant observed was *Lasthenia* sp. It grew in association with some of the *Plantago erecta* patches.

The total mapped area of *Plantago erecta* measured 15,747 ft.<sup>2</sup> (0.36 acre). However, the density of plants growing within these locations was extremely low, typically less than 5% of the total vegetative cover within a patch and often less than 1% of the vegetative cover. Thus the overall biomass of *Plantago erecta* was quite small.

Although we were not conducting a presence-absence survey for any life stages of the Quino Checkerspot butterfly, according to the Carlsbad office of the US Fish & Wildlife Service ([http://www.fws.gov/carlsbad/TEspecies/Documents/QuinoDocs/QuinoMonRef/Quino\\_Ref\\_Info.htm](http://www.fws.gov/carlsbad/TEspecies/Documents/QuinoDocs/QuinoMonRef/Quino_Ref_Info.htm)) the timing of our habitat assessment survey coincided with the period when late instar larvae or adults were being observed at other locations known to support the butterfly. However, no life stages of the Quino Checkerspot were seen during our field surveys.

## CONCLUSIONS

Existing habitat conditions for the Quino Checkerspot within study sites at Areas I and II, as well as in the extra study areas of the SSFL are of such poor quality that I would not expect the endangered butterfly to occur there at this time. This conclusion is based on the following factors:

- a) The Quino Checkerspot butterfly is not known to be associated with most of the predominant habitat types that characterize the study areas.
- b) Largely inappropriate conditions characterize those habitat types that occur at SSFL and are known to support food plants of the Quino Checkerspot, primarily due to the lack of open canopies, the prevalence of non-native grasses and forbs in the understory, etc.
- c) Like its relative, the threatened Bay Checkerspot (*Euphydryas editha bayensis*), the Quino Checkerspot has a highly colonial population structure. Populations are generally found where its larval and adult food plants grow in relatively high densities in patches scattered over dozens, if not hundreds of acres. In contrast, within our study area at SSFL, *Plantago erecta* is limited to a total of 0.36 acre, which represents only 0.08% of the entire study area.
- d) Where it does grow, *Plantago erecta* occurs at very low abundance, with densities typically less than 5% of the total herbaceous vegetative cover and often less than 1%.
- e) None of the checkerspot's secondary larval food plants were observed within our study sites.
- f) The only nectar plant observed was *Lasthenia* and it was of very limited abundance, even less than *Plantago erecta*.
- g) Lastly, all observed occurrences of *Plantago erecta* and *Lasthenia* were on rock outcrops, which are not considered suitable habitat for the Quino Checkerspot. The previously cited webpage of the Carlsbad office of the US Fish & Wildlife Service states "there has never been any demonstrated correlation between occupied Quino habitat and rock outcrops, nor have rock outcrops been described in any published Service documents as components or indicators of suitable habitat."

For these reasons, I conclude that the existing habitat conditions within our survey areas at SSFL are unsuitable to support the endangered Quino Checkerspot butterfly and it is extremely unlikely to occur there.

## REFERENCES CITED

BUGGY Data Base. 2012. Report of occurrences for the Quino Checkerspot Butterfly. Data Base maintained by Entomological Consulting Services, Ltd. Pleasant Hill, CA.

California Natural Diversity Data Base (CNDDB). 2012. Report of occurrences for the Quino Checkerspot Butterfly. CNDDB, Rarefind version 3.1.0. California Department of Fish and Game. Sacramento, CA.

Faulkner, D. 2010. Site Assessment for Quino Checkerspot Butterfly, Santa Susana Field Laboratory Area IV, Ventura County, California. Letter report dated 15 July 2010 and addressed to Thomas W. Mulroy of SAIC. 3 pp. & map.

NASA. 2011. Fall 2010 Habitat and Listed Species Surveys of NASA-Administered Property at Santa Susana Field Laboratory. Huntsville, AL. Final report.

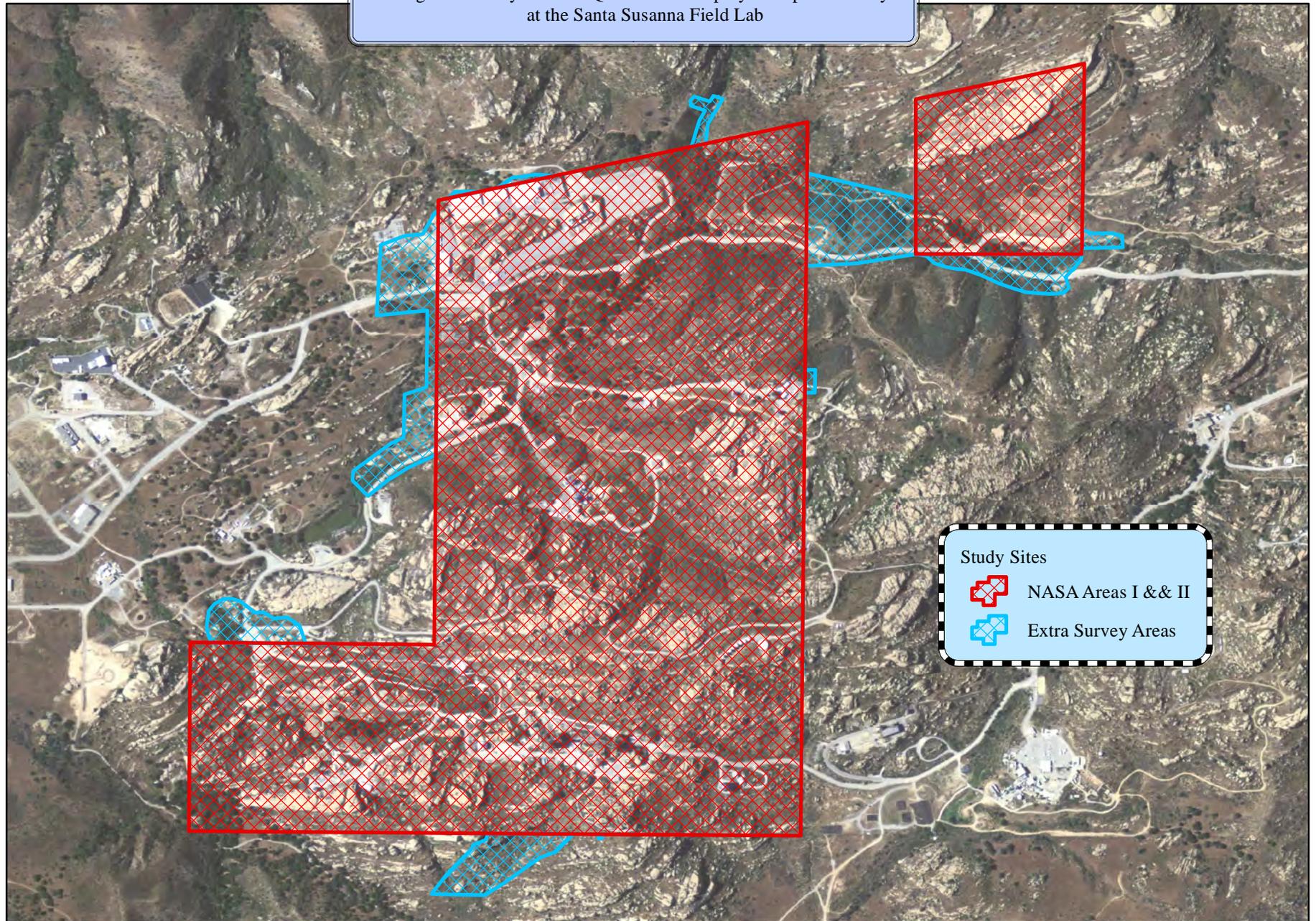
Pratt, G.F. and J.F. Emmel. 2010. Sites chosen by diapausing or quiescent stage Quino Checkerspot butterfly, *Euphydryas editha quino*, larvae. Journal of Insect Conservation 14:107-114.

U.S. Fish & Wildlife Service. 1997. Endangered and threatened wildlife and plants; determination of endangered status for the Laguna Mountains skipper and Bay Checkerspot butterfly. Federal Register 62:2313-2322.

U.S. Fish & Wildlife Service. 2003. Recovery plan for the Quino Checkerspot Butterfly. Portland, OR. 191 pp.

U.S. Fish & Wildlife Service. 2009. Revised designation of critical habitat for the Quino Checkerspot butterfly (*Euphydryas editha quino*). Federal Register 74:28776-28862.

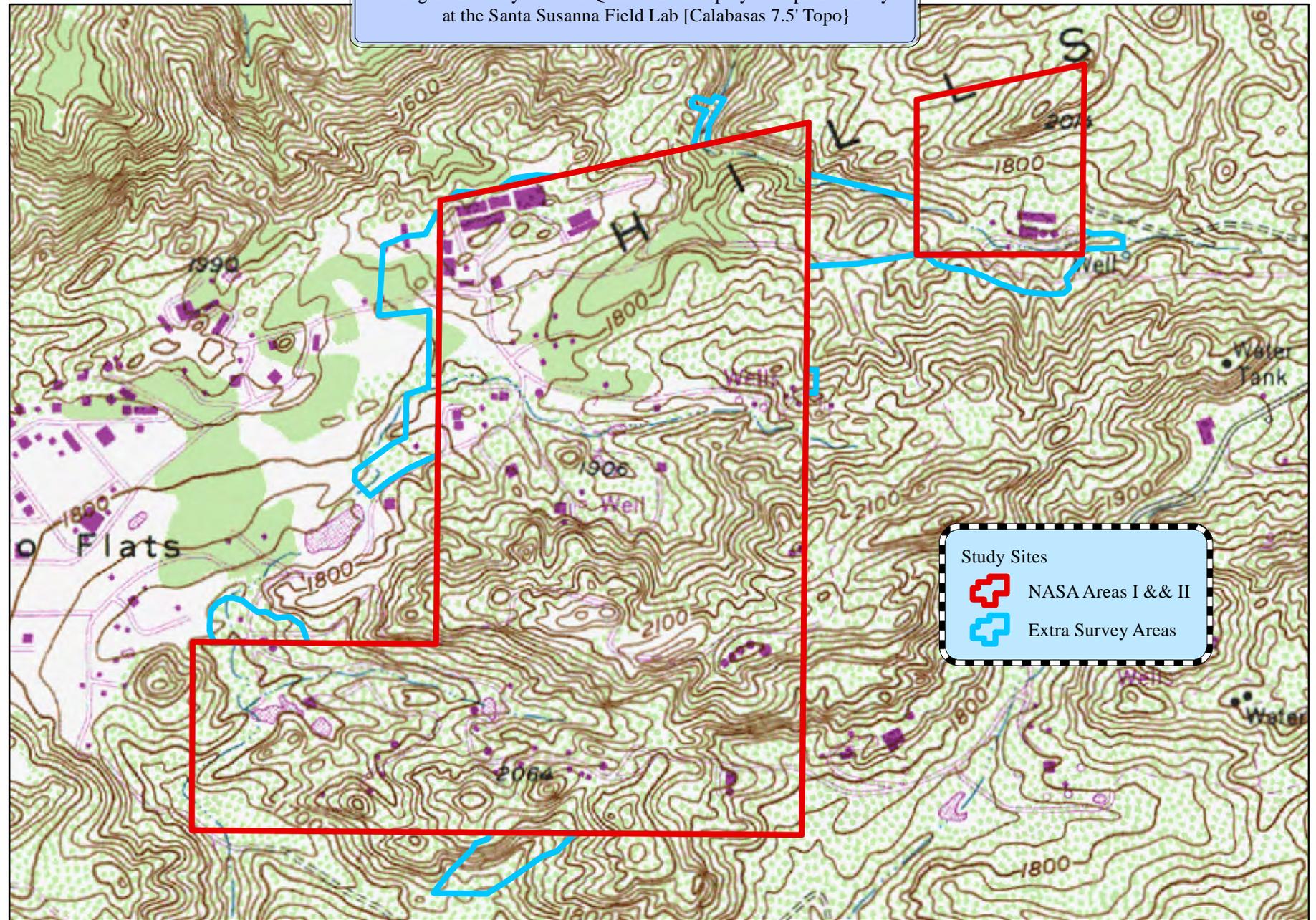
Figure 1. Study sites for Quino Checkerspoty Foodplant Survey at the Santa Susanna Field Lab



0 1,000 2,000 4,000 Feet



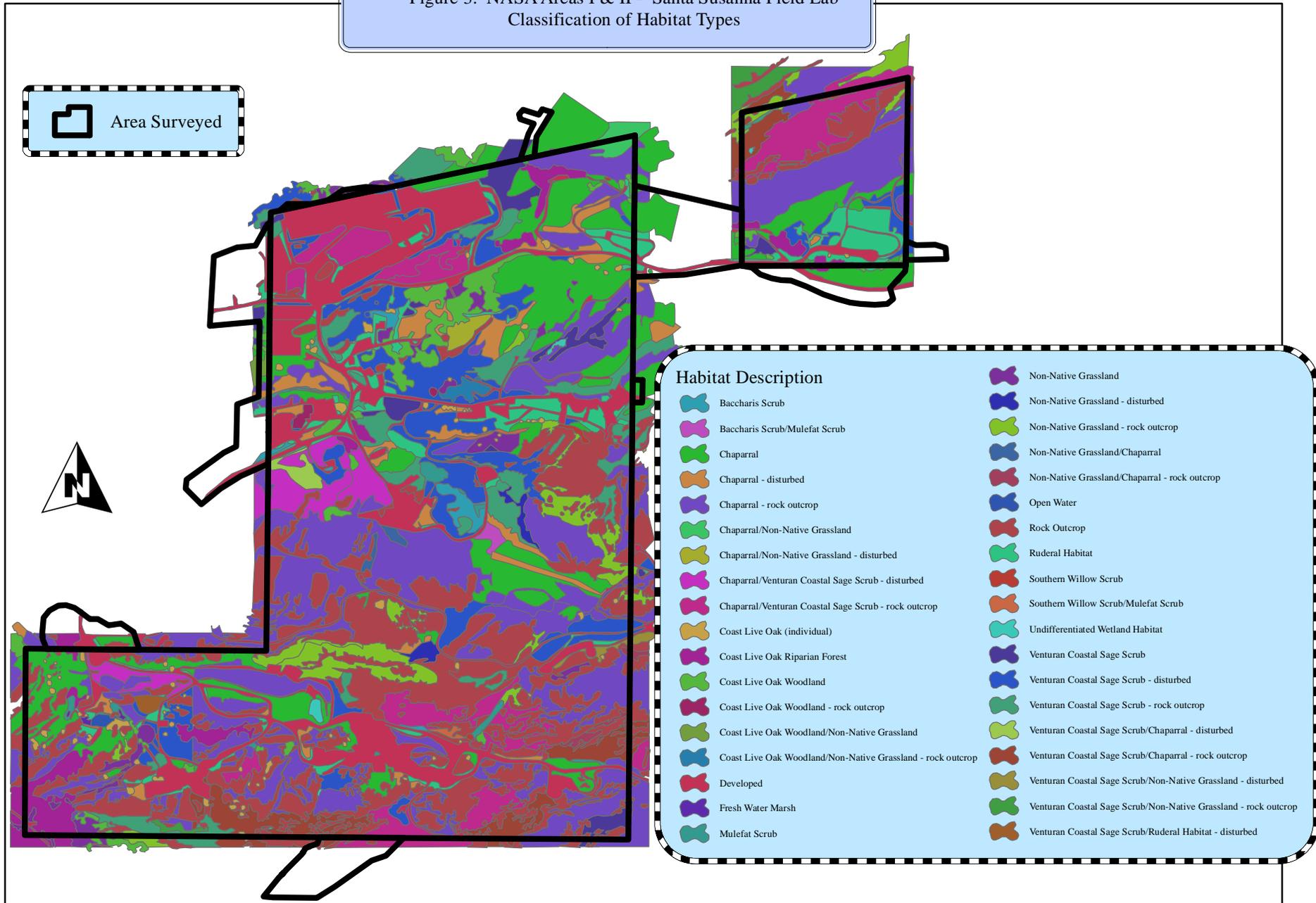
Figure 2. Study sites for Quino Checkerspot Foodplant Survey at the Santa Susanna Field Lab [Calabasas 7.5' Topo]



0 1,000 2,000 4,000 Feet

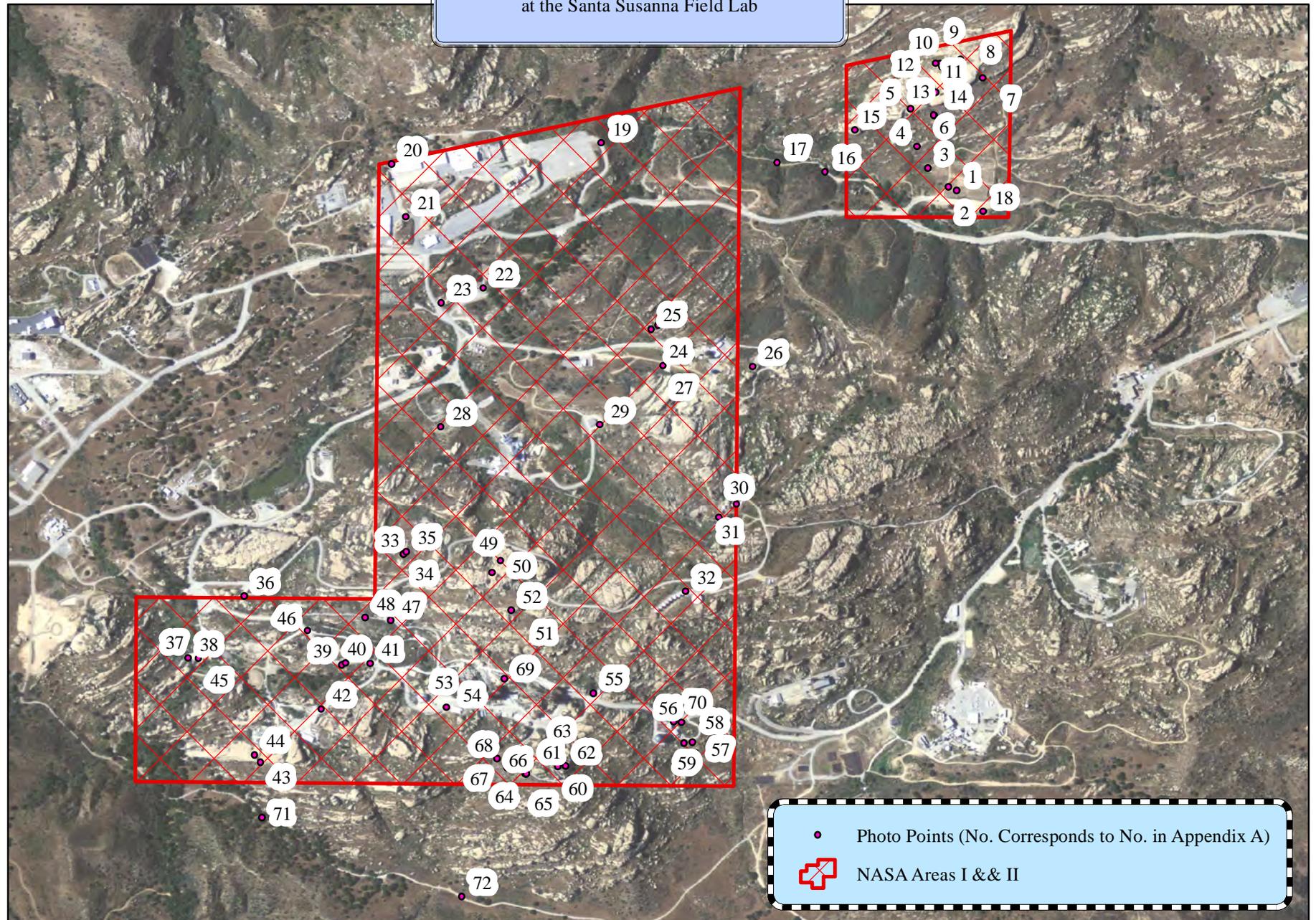


Figure 3. NASA Areas I & II - Santa Susanna Field Lab  
Classification of Habitat Types



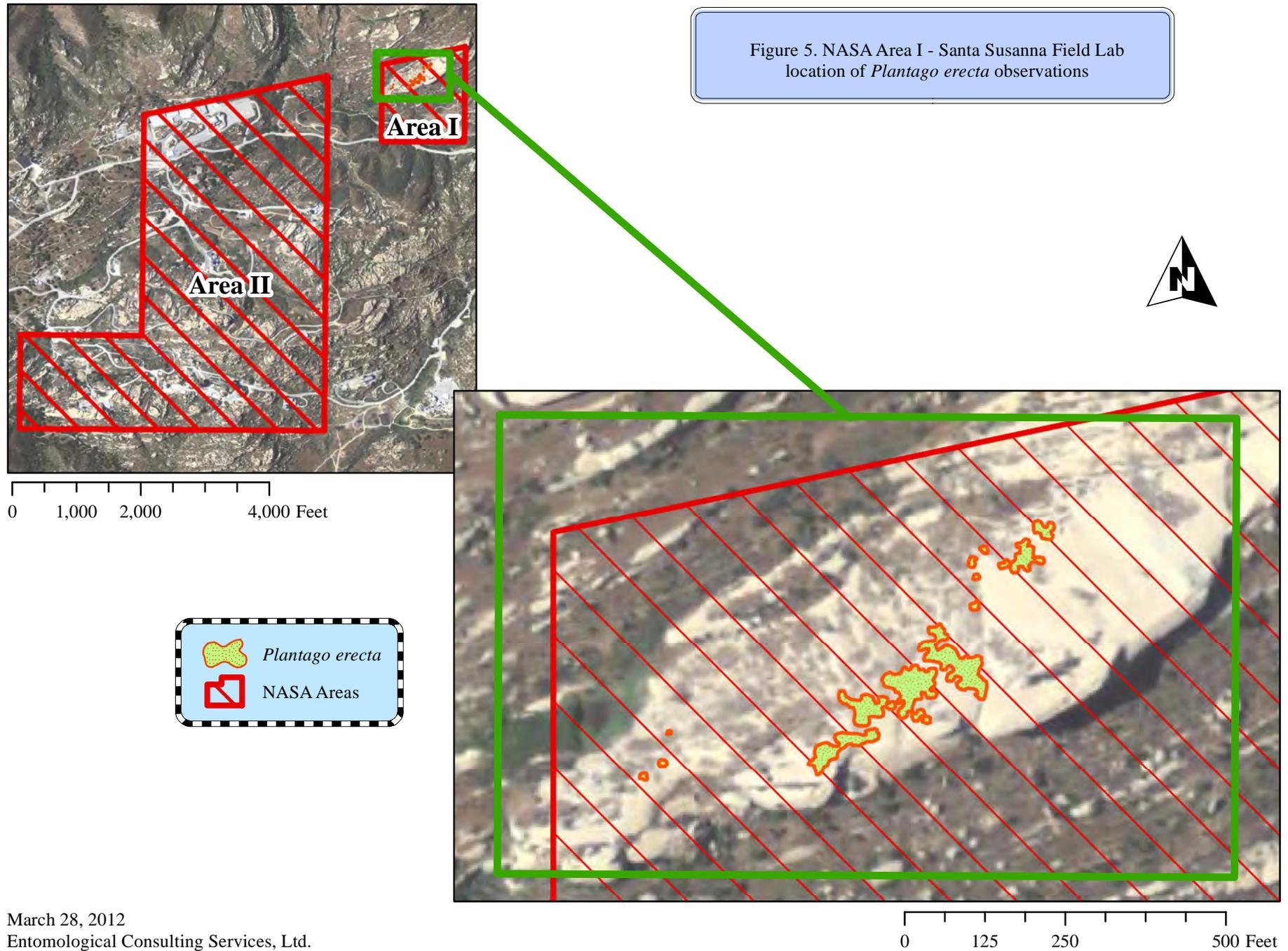
Habitat Description	
Baccharis Scrub	Non-Native Grassland
Baccharis Scrub/Mulefat Scrub	Non-Native Grassland - disturbed
Chaparral	Non-Native Grassland - rock outcrop
Chaparral - disturbed	Non-Native Grassland/Chaparral
Chaparral - rock outcrop	Non-Native Grassland/Chaparral - rock outcrop
Chaparral/Non-Native Grassland	Open Water
Chaparral/Non-Native Grassland - disturbed	Rock Outcrop
Chaparral/Venturan Coastal Sage Scrub - disturbed	Ruderal Habitat
Chaparral/Venturan Coastal Sage Scrub - rock outcrop	Southern Willow Scrub
Coast Live Oak (individual)	Southern Willow Scrub/Mulefat Scrub
Coast Live Oak Riparian Forest	Undifferentiated Wetland Habitat
Coast Live Oak Woodland	Venturan Coastal Sage Scrub
Coast Live Oak Woodland - rock outcrop	Venturan Coastal Sage Scrub - disturbed
Coast Live Oak Woodland/Non-Native Grassland	Venturan Coastal Sage Scrub - rock outcrop
Coast Live Oak Woodland/Non-Native Grassland - rock outcrop	Venturan Coastal Sage Scrub/Chaparral - disturbed
Developed	Venturan Coastal Sage Scrub/Chaparral - rock outcrop
Fresh Water Marsh	Venturan Coastal Sage Scrub/Non-Native Grassland - disturbed
Mulefat Scrub	Venturan Coastal Sage Scrub/Non-Native Grassland - rock outcrop
	Venturan Coastal Sage Scrub/Ruderal Habitat - disturbed

Figure 4. Photography Point Locations at the Santa Susanna Field Lab



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Appendix A  
Photodocumentation of  
Santa Susanna Field Lab  
NASA Areas I & II

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Santa Susanna Field Lab



Photo Point 1



Photo Point 2



Photo Point 3



Photo Point 4



Photo Point 5



Photo Point 6



Photo Point 7



Photo Point 8



Photo Point 9

Santa Susanna Field Lab



Photo Point 10



Photo Point 11



Photo Point 12



Photo Point 13



Photo Point 14



Photo Point 15



Photo Point 16



Photo Point 17



Photo Point 18

Santa Susanna Field Lab



Photo Point 19



Photo Point 20



Photo Point 21



Photo Point 22



Photo Point 23



Photo Point 24



Photo Point 25

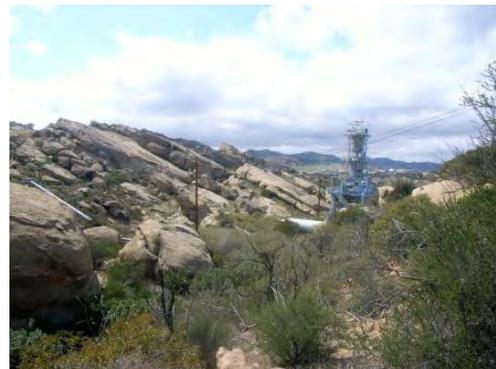


Photo Point 26



Photo Point 27

Santa Susanna Field Lab



Photo Point 28



Photo Point 29



Photo Point 30



Photo Point 31



Photo Point 32



Photo Point 33



Photo Point 34



Photo Point 35



Photo Point 36

Santa Susanna Field Lab



Photo Point 37



Photo Point 38



Photo Point 39



Photo Point 40



Photo Point 41



Photo Point 42

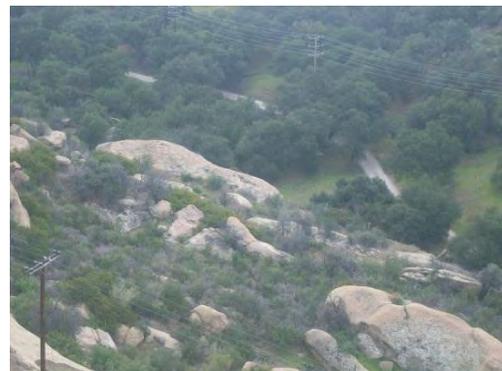


Photo Point 43



Photo Point 44



Photo Point 45

Santa Susanna Field Lab



Photo Point 46



Photo Point 47



Photo Point 48



Photo Point 49

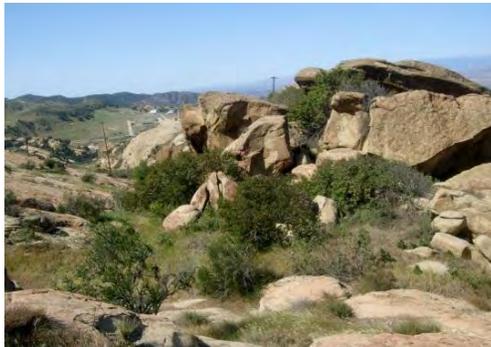


Photo Point 50



Photo Point 51



Photo Point 52



Photo Point 53



Photo Point 54

Santa Susanna Field Lab



Photo Point 55



Photo Point 56



Photo Point 57



Photo Point 58

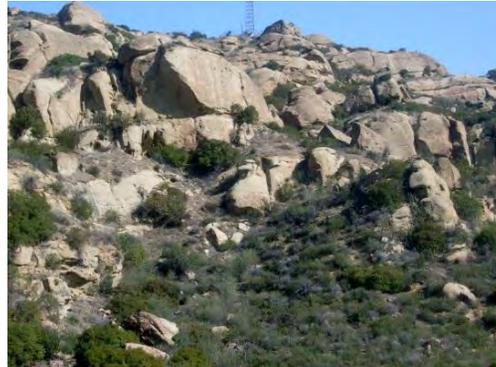


Photo Point 59



Photo Point 60



Photo Point 61



Photo Point 62



Photo Point 63

Santa Susanna Field Lab



Photo Point 64



Photo Point 65



Photo Point 66



Photo Point 67



Photo Point 68



Photo Point 69

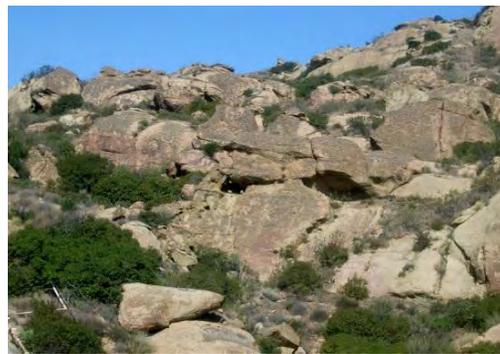


Photo Point 70



Photo Point 71

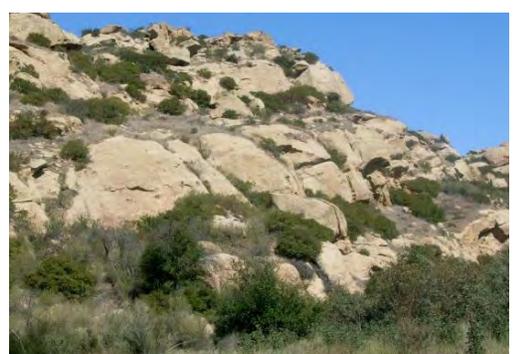


Photo Point 72

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